the hole diameter of the through-hole **10** and that on the side of its opening end is smaller than that of the through-hole **10**. The package **4** is soldered to the substrate **8** through the through-holes **10** so that the level difference of the lead **6** abuts on the mounting plane. In this case, since the lead level difference **13** is formed at the portion of the lead **6** not connected to the package **4** so that the bottom of the package **4** is not brought into contact with the conductor pattern formed on the periphery of the through-holes and solder for the lead and through-hole used for mounting. Thus, when a part of the molten solder will not flow into the slight gap formed between the package bottom and substrate **8** by the capillary phenomenon and hence the leads will not be short-circuited with each other.

Embodiment 4

FIG. **6A** is a side view showing a semiconductor device in which a semiconductor module according to the present invention is mounted on a substrate through a conductor patterns formed therein. FIG. **6B** is a front view thereof. In these figures, reference numerals **1** to **9** and **11** refer to like parts of the conventional element module and semiconductor device shown in FIG. **9**. Reference numeral **13** denotes one of lead level differences similar to that in FIGS. **4A** to **4C** and **5A**, **5B**. The package **4** is soldered to the substrate through the conductor patterns **11** so that its bottom forms a prescribed space with a mounting plane (i.e. upper surface of the substrate **8**). In this case, the lead level difference **13** is formed to provide different mechanical strengths according to the diameter of the lead. Therefore, in mounting, even when the thin portion of the lead **6** is bent abruptly at the position near to the lead level difference **13**, the thick portion of the lead **6** will not bend largely. Thus, the package **4** can be mounted on the substrate without attenuating the connecting strength between the package **4** and lead **6**, thereby decreasing the height after mounting as compared with the case in the prior art.

Embodiment 5

In the first to fourth embodiments, an explanation will be separately given of the case where the lead is soldered to the substrate **8** through the through-hole **10** formed therein (first and third embodiments), and the case where the lead **6** is soldered to the substrate **8** through the conductor pattern (second and fourth embodiment). However, where these cases are combined, e.g. where the lead is soldered through the conductor pattern provided on the mounting plane of the substrate, the semiconductor device can provide a more excellent high frequency characteristic. For this reason, the lead(s) requiring the high frequency characteristic may be soldered through the conductor pattern provided on the mounting plane of the substrate while the remaining lead(s) may be soldered through the through-hole located on the substrate to position the semiconductor element module, thus providing the same effect.

Embodiment 6

In the first to fifth embodiments, an explanation has been given of the case where the semiconductor element is an optical element, the semiconductor element may be an IC to provide the same effect.

In accordance with the present invention, a semiconductor element module and a semiconductor device can be provided which can prevent solder used for mounting from flowing in between the bottom of the package and substrate when the semiconductor element module is mounted on the substrate through the through-holes formed therein.

Further, in accordance with the present invention, a semiconductor element module and a semiconductor device can be provided which can lower the height after mounting when the semiconductor element module is mounted on the substrate through the conductor patterns provided on the mounting plane of the substrate.

What is claimed is:

1. A semiconductor element nodule, comprising:

a package having a base and opposing side surfaces;

a semiconductor element arranged within said package; and

a plurality of leads extending along said side surfaces of the package with an open end of each of said leads extending at least to a package attaching plane, wherein each of said leads is soldered to said substrate and electrically connected through said package to said semiconductor element and serving to connect said semiconductor element to an external circuit;

wherein said base is shaped to form an extended portion providing a level difference along the base portion between said package and the plurality of leads proximate said package attaching plane so that a space is formed between the leads and the package; and

wherein said level difference serves to avoid capillary flow of solder to prevent shore-circuiting between the leads adjacent to each other.

2. A semiconductor device, comprising:

a semiconductor element module according to claim **1**; and

a substrate having conductor patterns and through-holes for connecting the conductor patterns to each other, wherein each of said leads is soldered to the substrate through an operative one of said through-holes so that the bottom of said package abuts on a mounting plane of the substrate.

3. A semiconductor device, comprising a semiconductor element module including:

a substrate;

a package having a base and opposing side surfaces:

a semiconductor element arranged within said package; and

a plurality of leads extending along said side surfaces of the package with an open end of each of said leads extending at least to a package attaching plane, wherein each of said leads is soldered to said substrate and electrically connected through said package to said semiconductor element and serving to connect said semiconductor element to an external circuit;

wherein said base is shaped to form an extended portion providing a level difference along the base portion between said package and the plurality of leads proximate said package attaching plane so that a space is formed between the leads and the package; and

a substance having conductor patterns for lead connection on a mounting plane thereof wherein each of said leads is soldered to the substrate through holes in each of said conductor patterns so that the bottom of said package forms a prescribed space from the mounting plane to avoid capillary flow of solder.

4. A semiconductor element module, comprising:

a substrate;

a package having a base and opposing side surfaces;

a semiconductor element arranged within said package;

a plurality of leads extending along said side surfaces of the package with an open end of each of said leads extending at least to a package attaching plane, wherein

each of said leads is soldered to said substrate and electrically connected through said package to said semiconductor element and serving to connect said semiconductor element to an external circuit; and

brazing material for connecting said package and each of said leads;

wherein said base is shaped to form an extended portion providing a level difference along the base portion between said package and the plurality of leads proximate said package attaching plane so that a space is formed between the leads and the package; and

wherein said level difference permits each of said leads to be shaped proximate said package to avoid capillary flow of solder and prevent short-circuiting between the leads adjacent to each other.

5. A semiconductor element module, comprising:

a substrate;

a package having a base and opposing side surfaces;

a semiconductor element arranged within said package; and

a plurality of leads extending along said side surfaces of the package with an open terminal of each of said leads extending at least to a package attaching plane, wherein each of said leads is soldered to said substrate and electrically connected through said package to said semiconductor element and serving to connect said semiconductor element to an external circuit;

wherein a shape of said leads provides a level difference along the base portion between said package and the plurality of leads proximate said package attaching plane, said shape being such that a space is formed between the leads and the package; and

wherein said level difference serves to avoid capillary flow of solder to prevent short-circuiting between the leads adjacent to each other.

6. A semiconductor device comprising a semiconductor element module according to claim **5** and a substrate having conductor patterns and through-holes for connecting the conductor patterns to each other wherein each of said leads is soldered to the substrate through each said through-holes so that said level difference of each of said leads abuts on a mounting plane of the substrate.

7. A semiconductor device comprising a semiconductor element module including:

a substrate;

a package having a base and opposing side surfaces;

a semiconductor element arranged within said package; and

a plurality of leads extending along said side surfaces of the package with an open terminal of each of said leads extending at least to a package attaching plane, wherein each of said lead, is soldered to said substrate and electrically connected through said package to said semiconductor element and serving to connect said semiconductor element to an external circuit;

wherein a shape of said leads provides a level difference along the base portion between said package and the plurality of leads proximate said package attaching plane, said shape being such that a space is formed between the leads and the package; and

a substrate having conductor patterns for lead connection on a mounting plane thereof wherein each of said leads is soldered to the substrate through holes in each of said conductor patterns so that the bottom of said package forms a prescribed space from the mounting plane; and

wherein said level difference serves to avoid capillary flow of solder to prevent short-circuiting between the leads adjacent to each other.

8. A semiconductor element module comprising:

a substrate;

a package having a base and opposing side surfaces;

a semiconductor element arranged within said package;

a plurality of leads extending along said side surfaces of the package with an open terminal of each of said leads extending at least to a package attaching plane, wherein each of said leads is soldered to said substrate and electrically connected through said package to said semiconductor element and serving to connect said semiconductor element to an external circuit;

brazing material for connecting said package and each of said leads;

wherein a shape of said leads provides a level difference along the base portion between said package and the plurality of leads proximate said package attaching plane, said shape being such that a space is formed between the leads and the package; and

wherein said level difference provides different mechanical strengths permitting each of said leads to be bent proximate said package to avoid capillary flow of solder and prevent short-circuiting between the leads adjacent to each other.

9. A semiconductor element module according to claim **1**, wherein said semiconductor element is an optical element.

10. A semiconductor element module according to claim **5**, wherein said semiconductor element is an optical element.

* * * * *